

diately emerge and bear them to the common heap, as if conscious of having been guilty of an error. A smaller hole near to the south-east corner of the square, is the only other means by which the interior can be reached, and down this aperture, marked *b*, the flowers gathered by the black workers are carried along the line *c*, from the heap in the centre of the square, by a number of smaller yellow workers (No. 1), who, with their weaker frames and less developed mouth organs, seem adapted for the gentler office of nurses for the colony within. It is remarkable that no black ant is ever seen upon the line *c*, and no yellow one ever approaches the line *a*, each keeping his own separate station and following his given line of duty with a steadfastness which is as wonderful as it is admirable. By removing the soil to a depth of about three feet, and tracing the course of the galleries from the entrance (*b*) and (*d*), a small excavation is reached, across which is spread in the form of a spider's web, a net work of squares spun by the insects, the squares being about one-quarter inch across, and the ends of the web fastened firmly to the earth of the sides of the hollow space which forms the bottom of the excavation. In each one of the squares, supported by the web, sits one of the honey-making workers (No. 2), apparently in the condition of a prisoner, as it does not appear that these creatures ever quit the nest. Indeed it would be difficult for them to do so, as their abdomens are so swollen out by the honey which they contain, as to render locomotion a task of difficulty, if not to make it utterly impossible.

The workers (No. 1), provide them with a constant supply of flowers and pollen, which, by a process analogous to that of the bee, they convert into honey. The fact that the remainder of the inhabitants feed on the supply thus obtained, though it is surmised, has not been established by actual observation; indeed with reference to many of the habits of these creatures, we are at present left in total ignorance, it being a reasonable supposition that, in insects so remarkable in many of their habits, other interesting facts are yet to be brought to light respecting them. It would be of great value to learn the specific rank of the black workers (No. 3), and to know the sexes of the species forming the community, their season and manner of pairing, and whether the honey-makers are themselves used as food, or if they excrete their saccharine fluid for the benefit of the inhabitants in general, and then proceed to distil more. I regret that at this time I am only able to bring before the notice of the Academy, specimens of the honey-makers (No. 2), the other members of the community, except from Captain Fleeson's description, being quite unknown to me. It is, however, my hope that at a future meeting I may be enabled to exhibit the other varieties, and to give some more extended information upon this very interesting subject. The honey is much sought after by the Mexicans, who not only use it as a delicate article of food, but apply it to bruised and swollen limbs, ascribing to it great healing properties. The species is said to be very abundant in the neighbourhood of Santa Fé, New Mexico, in which district the observations of Capt. Fleeson were made.

NOTES

THE arrangements for the forty-third meeting of the British Association at Bradford, have been pretty nearly completed. The General Committee will meet on September 17, the opening day, at 1 P.M., for the election of sectional officers, and the despatch of business usually brought before that body. The concluding meeting takes place on September 24. We regret very much to hear that Mr. Joule, on account of ill-health, has been compelled to resign the presidency; Prof. W. A. Williamson, will, it is said, be appointed in his place.

THE forty-sixth meeting of the German Association of Naturalists and Physicians will be held this year at Wiesbaden from September 18 to 24. Communications are to be addressed to Drs. Fresenius and Haas Senior.

WE are glad to see so influential a paper as the *Times* give so prominent a place to a notice of Sir Charles Wheatstone's election to the French Academy, which we ourselves noted a fortnight ago. There is no doubt that if we take into consideration the amount and value of the services Sir Charles has rendered to Science, both in its theoretical and practical aspects, he must be ranked as among the most eminent men of the time. The following is the notice in the *Times* :—

"Sir Charles Wheatstone was elected, on the 30th ult., Foreign Associate of the French Academy of Sciences, to fill the vacancy occasioned by the death of Baron Liebig. He was for many years previously corresponding member of the Academy; but the honour recently conferred upon him is the highest which it is in the power of that body to confer upon a foreigner. The election was nearly unanimous, as he obtained 43 out of 45 votes. Sir Charles has also lately received from the French Society for the Encouragement of National Industry the great medal of Ampère, which is awarded every six years for what is considered the most important application of Science to Industry. The former recipients of this medal were Henri Sainte-Claire Deville, who introduced the manufacture of aluminum; De Lesseps, the Engineer of the Suez Canal; and Boussingault, distinguished for his researches in agriculture.

GUSTAV ROSE, the celebrated mineralogist, died after a few days' illness on the 15th inst., in the 75th year of his age and the 50th of his connection with the University of Berlin. His mind and power of work remained unimpaired almost to the last, and he was able on his sick bed to dictate to his son the results of his last researches.

MR. J. S. DAVENPORT was elected on Wednesday, the 16th inst., Assistant-Secretary to the Royal Horticultural Society, in the place of Mr. Richards, who has accepted a post under the Commissioners of the International Exhibition.

THE Chair of Physiology at Edinburgh is likely to be soon vacant, we believe, by the resignation of Prof. Hughes Bennet, from ill health. There are several likely candidates for the prospective vacancy, all of them good men :—Dr. McKendrick, who has for some time efficiently discharged the duties of the chair, and a paper by whom in conjunction with Mr. James Dewar, on the Physiological Action of Light, we published a fortnight ago; Prof. Rutherford, a former assistant of Prof. Bennet's, and Dr. J. Bell Pettigrew, F.R.S., who has distinguished himself as an investigator in comparative anatomy. There is a rumour that Prof. Burdon Sanderson is also a candidate.

WE regret very much to hear that Mr. Saville Kent has resigned his position in connection with the Brighton Aquarium. We do not desire to express any opinion upon the misunderstanding which has resulted in Mr. Kent's resignation, but we cannot help saying that we consider it a great loss to Science that the Aquarium is now without a resident naturalist. The Brighton Aquarium offers unequalled opportunities for studying the habits of fishes, and during Mr. Kent's short connection with the establishment he has considerably increased our knowledge of this department of Natural History, and we confidently looked to the Aquarium to add still more to scientific knowledge in this direction. It would be a grievous thing, indeed, if the Directors should allow their fine establishment to degenerate into a mere place of popular amusement.

MR. GEORGE SMITH returned on Saturday last from his successful labours in Assyria.

THE number of institutions in America devoted to education of all kinds and of all grades, endowed and supported both by the State and by the generosity of private individuals, theoretically and practically open to all-comers, is almost sufficient to fill a Briton with envy and chagrin, when he contrasts it with the comparative meagreness of the educational means of his own country, hampered with so many traditional restrictions. One of the most admirable, best organised, and most successful of these American institutions is the Sheffield Scientific School of Yale College, the Eighth Annual Report of which for 1872-73 we have just received. The School forms the Scientific Faculty of Yale College, on the same footing as the other faculties of Arts, Medicine, Law, and Divinity, and, to judge from the Report, must be one of the most successful and efficient scientific schools in the world. It owes its name to Mr. Joseph E. Sheffield, who, in 1860, presented it with a magnificent building and a liberal endowment, and has since frequently munificently increased his original gifts, his last one being an additional building of five stories, with ample accommodation, which was very much needed to meet the rapid increase in the number of students, which, during the last session, was 201. The education supplied is in all branches of Science, students being at liberty to choose a course of instruction to fit them for pure scientific research, or for some practical application of scientific principles, as engineering, agriculture, &c. The school is most liberally supplied with scientific apparatus in all departments, seems to have plenty of funds at its command, furnished both by the State and by private individuals, and, to judge from the prospectus, provides students with a thoroughly well-organised and complete course of scientific instruction in each of its numerous departments. "The benefit," the report says, "which the Scientific School has conferred upon the State in turning out young men who, on leaving the institution, are enabled to assume the position of leaders in their several callings, and of educators of the people to a higher grade of culture, increasing the productive brain capacity as well as the material wealth of the country, cannot be estimated in dollars and cents. From all parts of the country come back most favourable reports of the graduates who have been sent out, and their influence, already great, is constantly on the increase. The people of this state cannot do too much for an institution which has already done and is continuing to do so much for them, by developing the material resources of Connecticut, and by extending its reputation throughout the entire country."

IN this month's number of the *American Journal of Science and Art* Mr. Sellack gives a short but interesting account of his photographic work among the southern star-clusters at the Argentine National Observatory, Cordoba, where, for this purpose, he has been for some time at the expense of some gentlemen from Boston, U.S.A. On his arrival at Cordoba Mr. Sellack found the lens of the photographic refractor he was to use, broken, but by dint of perseverance and ingenuity he managed to put the pieces together in such a manner as to enable him to obtain a well-defined, nearly circular, photographic image of stars of the first and second magnitude; and with exposures of eight minutes, even stars of the ninth magnitude, of white colour, give a photographic impression. We have received a lunar photograph obtained by Mr. Sellack, and although it will not bear comparison with the well-known photographs obtained by other astronomers who have devoted attention to the subject, nevertheless the impression submitted to us reflects great credit on Mr. Sellack, considering the difficulties he had to contend with in getting it taken. The picture has suffered

somewhat by too long an exposure in the telescope and over development.

WE have received from Mr. Gerard Krefft, Curator of the Sydney Museum, what he calls "a splendid bit of mimicry," in the shape of a photograph of the chrysalis of *Papilio sarpedon*. The chrysalis seems to be attached to a leaf, and has itself contrived to assume the shape of a leaf, or rather of a part of the leaf to which it is attached. Its colour, Mr. Krefft says, is pale green, or sea-green.

THE last number of the *Journal of the Linnean Society* is entirely occupied by Mr. Bentham's important paper on the structure, classification, and history of development of the Compositæ, the largest and most natural order in the vegetable kingdom. In accordance with the system proposed in the "Genera Plantarum," he divides the order into 13 sub-orders, viz.: 1, Vernoniaceæ; 2, Eupatoriaceæ; 3, Asteroideæ; 4, Inuloidæ; 5, Helianthoidæ; 6, Helenioidæ; 7, Anthemideæ; 8, Senecionideæ; 9, Calendulaceæ; 10, Arctotideæ; 11, Cynaroideæ; 12, Mutisiaceæ; 13, Cichoriaceæ; the most important diagnostic characters depending on the structure of the pistil (in the hermaphrodite flowers), fruit, androecium, corolla, and calyx (pappus). A very exhaustive account is given of the geographical distribution of the sub-orders and principal families; and the first appearance of the order is traced with probability to Africa, Western America, and probably Australia; the difference between the forms now observed in the northern and southern hemispheres having become developed only after the tropical belt introduced an impassable barrier between them. It is one of the most important contributions to structural and systematic botany which has issued from this country for many years.

DR. ROBERT SCHLESINGER publishes (from the house of Orell, Füssli & Co., Zurich) a small work on the microscopical examination of Textile Fabrics in the raw and coloured state, with a note on the mode of detecting "shoddy-wool." It contains a complete account of the fabrics made from the various vegetable fibres in more or less common use, also from hair and silk, with their distinguishing characteristics, as exhibited under the microscope, when raw, spun or woven, and dyed, illustrated with 27 woodcuts, and introduced by a preface by Dr. Emil Kopp.

THE current number of the *Zoologist* commences with a paper by Mr. F. H. Balkwill, having the pretentious title "A Difficulty for Darwinists," in which, like many others who do not fully understand the subject, he lays too much stress on the possibility of slight variations in an *infinite* number of directions. No doubt it is theoretically possible for an infinite number of variations to occur in living bodies, if they are within the influence of an infinite number of different forces, just as the result of a very large number of forces acting on a particle, may cause it to take one of almost an infinite number of directions. But the forces acting on the living body are comparatively limited, and when as in the cases of the Thylacine and the Dog, or of the Wombat and the Rodent, which are the author's stumbling-blocks, the forces which have been called to act on the Marsupial and Placental types of organism have been practically identical, they having had to undergo the struggle for existence under similar circumstances, it is not to be wondered at, but only to be expected, that similar organisms should be the result, especially as the two types to start with are not separated by any great interval. It is just as probable, external circumstances being similar, that the isolated Marsupial ancestor should give rise to carnivorous, rodent, and herbivorous forms, as that they should be developed from a Placental type.

THE current part of Mr. Dresser's "Birds of Europe" commenced with the description of the Imperial Eagle (*Aquila mogilnik*), to which two plates are devoted, in one of which the young of that species is contrasted with that of the distinctly separated White-shouldered Imperial Eagle (*Ag. adalberti*), from Spain. This is followed by illustrated descriptions of the Algerian Black-headed Jay (*Garrulus cervicalis*), the Siberian Jay (*Perisoreus infaustus*), the White Stalk (*Ciconia alba*), several Anserine birds, and the Isabelline Lark (*Galerita isabellina*), which, by the way, does not occur in Europe.

It is locally stated that among the collections made by the Chilean exploring expeditions on the west coast of Patagonia in the *Chacabuco*, is a specimen of the huemul, an animal which had altogether been lost sight of. There are five well-prepared skins in the National Museum of Chile. Molina mentions it in his "Natural History of Chile," published in 1782. He describes a species of horse (*Equus bisulcus*), or rather an ass, with its hoofs divided like ruminants. He says it inhabits the most inaccessible parts of the Andes, and is difficult to be taken. Mr. E. C. Reed, of the National Museum of Chile, pronounces it to be a stag of the genus *Cervus*, and as not belonging to any new genus.

THE record of the "Astronomical and Meteorological Observations made during the year 1870 at the U.S. Naval Observatory" occupies a bulky quarto volume of about 1000 pages, and contains in its numerous carefully-constructed tables sufficient evidence of the amount and value of the work done at the Observatory. The U.S. Government contribute liberally to the support of the Observatory, the work of which is performed by an efficient staff. One of the most interesting parts of the record of work for 1870 is that describing the details of the Transit Circle.

We would recommend to all interested in education a pamphlet by Mr. Henry Leedam, a practical teacher, entitled "Complete School Education." It is evidently the result of much thought and observation, and of advanced views of what constitutes a complete education even for boys intended for business. We are glad to see that in his system he gives great prominence to science, as one of the most efficient instruments in general training.

THE Liverpool papers report that a sharp shock of earthquake was felt at Southport on the evening of Wednesday, July 16, accompanied by a loud report. It was thought at first by many that a colliery explosion must have taken place in some of the collieries near Ormskirk, so loud and distinct was the first report. The other three—for there were four shocks—followed much quicker after each other than did the second after the first. There was no undulatory motion such as accompanied the severe shock which occurred about two years since.

ON May 10 a strong shock of earthquake, lasting two seconds, occurred at Opiape, in North Chile.

A COLLECTION of stone implements from Costa Rica, in Central America, has been sent to the American Museum of Natural History in New York.

DON CARLOS MOESTA, formerly Director of the Astronomical Observatory at Santiago, in Chile, has been appointed Chilean Consul-General in Saxony.

THE sixth annual report of the Provost of the Peabody Institute of Baltimore, to the trustees, dated June 5 of this year, is in all respects very satisfactory, and shows that the Institute forms an important means of education, literary and scientific, in the city to which it belongs. The library is a large one, upwards of 50,000 volumes, and the number of readers has in-

creased considerably during the year, the proportion of scientific works sought for being on the whole, as things go, large. During the year 120 lectures were delivered, of which 20 were popular, and 90 special class lectures in particular departments. Though scientific lectures seem to be much less attractive than lectures in literature, still the Provost rightly thinks they should be persisted in, especially as this is one of the main objects of the institution, which is well supplied with scientific apparatus. We have no doubt that by judicious arrangement of subjects and hours, and by securing competent lecturers who know how to make their subjects attractive, scientific lectures will become increasingly popular.

We give the following on the authority of the *American Artisan*:—The President of Rutgers College, New Jersey, Dr. Campbell, recently found beneath some of the trees in the campus, numerous carpenter bees, each minus its head. Having called the attention of Rev. Samuel Lockwood, the eminent naturalist, to the fact, careful observations were made with interesting results. It was first noted that these bees were all of the same species, and were all honey-gatherers. The case at first appeared to be one of wanton massacre; the merciless executioners being common Baltimore orioles. On making a more thorough examination of the headless trunks, it was discovered that every body was empty, the insect having been literally eviscerated at the annular opening made at the neck by the separation of the head. The interesting fact disclosed by these observations is that these birds had learned that the body of these particular bees—the stingless males—were filled, or contained honey sipped from the blossoms of the horse-chestnut; and so they watched the insects until they were fully gorged, then, darting upon them, snipped off their heads, and always at one place, the articulation, thus showing themselves acquainted with the anatomy of their victims as well as their habits, and taking advantage of both for the gratification of their love for sweets.

THE *Journal of the Franklin Institute* says that the splendid telescope designed for the National Observatory at Washington will, in all probability, soon be erected and in use. The work upon the new tower and dome, intended for its reception, is being rapidly brought to completion. The object-glass—the largest in the world, twenty-six and a half inches diameter, and thirty-two feet focal length—is now finished, and ready for the instrument. The cost of the new instrument, with the necessary machinery, will be about 30,000 dols., and that of the tower and dome, erected to receive it, about 15,000 dols. If to this we add the list of new apparatus already acquired or in process of construction for the Observatory, for the observation of the coming transit of Venus, the Institution will shortly be as well or, perhaps, better equipped than any other of its kind in the world.

THE additions to the Zoological Society's Gardens during the past week include two Argus Pheasants (*Argus giganteus*) from Malacca, presented by his Excellency, Sir H. Ord; a Jaguar (*Felis onca*) from America, presented by Mr. J. H. Murchison; a Himalayan Bear (*Ursus tibetanus*) presented by Mr. G. R. Taylor; two Mulita Armadillos (*Tatusia hybrida*) from Buenos Ayres, presented by Mrs. Mackinlay; two White-crested Guans (*Pipile jacutinga*) from British Honduras, presented by Mr. S. Carmichael; a Patas Monkey (*Cercopithecus ruber*) from West Africa, presented by Mr. E. Hoal; three Black Vultures (*Cathartes atratus*) from America, presented by Mr. C. C. Loversy; three Fournier's Capromys (*Capromys pilorides*) from Cuba, presented by Mr. J. R. Watkins; a Rhesus Monkey (*Macacus erythraeus*) from India, presented by Miss E. D. Whithart; a Sable Antelope (*Hippotragus niger*), from South Africa, deposited.